

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>P 98-568/FA</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/SE 98/02161</b>	International filing date (day/month/year) <b>27 November 1998</b>	(Earliest) Priority Date (day/month/year) <b>27 November 1997</b>
Applicant <b>Asea Brown Boveri AB et al.</b>		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ Certain claims were found unsearchable (See Box I).
2. ☐ Unity of invention is lacking (See Box II).
3. ☐ The international application contains disclosure of a nucleotide and/or amino acid sequence listing and the international search was carried out on the basis of the sequence listing
  - ☐ filed with the international application.
  - ☐ furnished by the applicant separately from the international application,
    - ☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.
  - ☐ transcribed by this Authority.
4. With regard to the title, ☐ the text is approved as submitted by the applicant.  
☒ the text has been established by this Authority to read as follows:  

A method and a system for speed control of a rotating electrical machine with flux composed of two quantities.
5. With regard to the abstract,
  - ☒ the text is approved as submitted by the applicant.
  - ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. The figure of the drawings to be published with the abstract is:  
 Figure No. 2 ☒ as suggested by the applicant. ☐ None of the figures.  
☐ because the applicant failed to suggest a figure.  
☐ because this figure better characterizes the invention.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 98/02161

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H02P 7/36, H02P 9/14, H02K 19/26, H02K 19/34, H02K 19/38, H02K 16/02,  
H02K 17/44, H02K 21/14, H02K 3/40

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H02K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4121148 A (H. PLATZER), 17 October 1978 (17.10.78), see the whole document  --	1-14,17-22
Y	US 4785138 A (O. BREITENBACH ET AL), 15 November 1988 (15.11.88), see the whole document  --	1-14,17-22
A	Alf Alfredsson et al., "Elkraft teknisk handbok 2, Elmaskiner", 1986, Almqvist & Wiksell Tryckeri, (Uppsala), chapter 2, page 121 - 123  -- -----	13-14

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

26 March 1999

Name and mailing address of the ISA/

Swedish Patent Office

Box 5055, S-102 42 STOCKHOLM

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Date of mailing of the international search report

08-04-1999

Authorized officer

Hans Bagge af Berga

Telephone No. +46 8 782 25 00

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

02/03/99

International application No.

PCT/SE 98/02161

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4121148 A	17/10/78	AT 340523 A,B	27/12/77
		DE 2714188 A,B,C	17/11/77
		FI 64871 B,C	30/09/83
		FI 771140 A	28/10/77
		FR 2349992 A,B	25/11/77
		GB 1541406 A	28/02/79
		NL 165615 B,C	17/11/80
		NL 7703629 A	31/10/77
		SE 423295 B,C	26/04/82
		SE 7704784 A	28/10/77
<hr/>			
US 4785138 A	15/11/88	DE 3543106 A,C	11/06/87
<hr/>			

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# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/SE 99/00943

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H02J 3/36

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H02J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
D,A	WO 9745908 A1 (SIEMENS AKTIENGESellschaft), 4 December 1997 (04.12.97), figure 3, abstract	1-27
A	WO 9843336 A2 (ASEA BROWN BOVERI AB), 1 October 1998 (01.10.98), page 7, line 1 - line 10, figure 1	1-27
A	US 5499178 A (NED MOHAN), 12 March 1996 (12.03.96), column 13, line 5 - line 31, figure 8	1-27

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

- \* Special categories of cited documents
- "A" document defining the general state of the art which is not considered to be of particular relevance
- "B" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another claim or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

16 February 2000

22-02-2000

Name and mailing address of the ISA/  
Swedish Patent Office  
Box 5055, S-102 42 STOCKHOLM  
Facsimile No. +46 8 666 02 86

Authorized officer

Tomas Erlandsson/mj  
Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT  
Information on patent family members

International application No.  
PCT/SE 99/00943

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9745908 A1	04/12/97	DE 19620906 A	08/01/98
		EP 0939995 A	08/09/99
WO 9843336 A2	01/10/98	AU 3468797 A	21/01/98
		CA 2218942 A	24/09/98
		EP 0909354 A	21/04/99
		SE 9701060 A	04/03/98
		SE 9703329 A	25/09/98
		US 5980095 A	09/11/99
US 5499178 A	12/03/96	WO 9418683 A	18/08/94
		EP 0617858 A	05/10/94
		JP 7502160 T	02/03/95
		US 5345375 A	06/09/94
		WO 9312576 A	24/06/93

## PATENT COOPERATION TREATY

PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 30 MARS 2000

WIPO

PCT

Applicant's or agent's file reference P 98-568 FA/uh	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/SE98/02161	International filing date (day/month/year) 27.11.1998	Priority date (day/month/year) 27.11.1997
International Patent Classification (IPC) or national classification and IPC <sub>7</sub> H 02 P 7/36, H 02 P 9/14, H 02 K 19/26, H 02 K 19/34, H 02 K 19/38		
Applicant ABB AB et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
- ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of \_\_\_\_\_ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand  23.06.1999	Date of completion of this report  17.03.2000
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer  Hans Bagge of Berga/mj Telephone No. 08-782 25 00

Form PCT/IPEA/409 (cover sheet) (January 1994)

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE98/02161

## I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

- ☒ the international application as originally filed.
- ☐ the description, pages \_\_\_\_\_, as originally filed,  
 pages \_\_\_\_\_, filed with the demand,  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_.
- ☐ the claims, Nos. \_\_\_\_\_, as originally filed,  
 Nos. \_\_\_\_\_, as amended under Article 19,  
 Nos. \_\_\_\_\_, filed with the demand,  
 Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_.
- ☐ the drawings, sheets/fig \_\_\_\_\_, as originally filed,  
 sheets/fig \_\_\_\_\_, filed with the demand  
 sheets/fig \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 sheets/fig \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/fig \_\_\_\_\_

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE98/02161

## V. Resoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

## 1. Statement

Novelty (N)	Claims	<u>1-32</u>	YES
	Claims	<u></u>	NO
Inventive step (IS)	Claims	<u>1-32</u>	YES
	Claims	<u></u>	NO
Industrial applicability (IA)	Claims	<u>1-32</u>	YES
	Claims	<u></u>	NO

## 2. Citations and explanations

The claimed invention relates to a system for adaptation of the speed of a rotating electric machine included in the system. Previous solutions in speed adaptation include slip rings. Use of slip rings in speed adaptation entails a number of disadvantages such as wear, fouling and hence increased maintenance costs.

It is an aim of the invention to over-come the above-mentioned disadvantages. According to the invention, this aim is accomplished by providing an auxiliary winding in the stator of the machine. The auxiliary winding and the ordinary winding together generate the resultant stator and air gap flux of the machine. Each flux is composed of at least two vectorial quantities.

Documents cited in the International Search Report:

D1 US, A, 4 121 148  
D2 US, A, 4 785 138  
D3 Elkraftteknisk handbok, section 2 Elmaskiner, Alfredsson A, Jacobsson K A, Rejminger A, Sinner B, Esselte Studium, 1986, ISBN 91-24- 35459-7, chapter 2, pp. 121-123.

In this International Preliminary Examination Report these documents are considered to show the general technological background of the invention.

Document D1 describes a generator with an auxiliary winding in the stator. The auxiliary winding is used to generate power to the magnetising equipment (see the whole document).

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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE98/02161

**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V.

Document D2 discloses a cable to be used as winding in a linear electric machine. The cable includes inner and outer semi-conducting layers with insulation there-between (see the whole document).

Claims 1, 9, 21 and 22

Claims 1, 9, 21 and 22 describe a system and a method for speed adaptation/optimisation of a rotating electric machine included in the system. The machine has windings of a special construction, furthermore, the system comprises means that generate the resultant stator and air gap flux of the machine, and the flux is composed of at least two vectorial quantities.

There is one difference between the known technique according to D1 and the features in claims 1, 9, 21 and 22 relating to generation of the flux. The difference is that D1 does not state that the stator and the air gap flux should be composed of at least two vectorial quantities. Furthermore, in D1 there are no hints leading a person skilled in the art towards these features of claims 1, 9, 21 and 22.

Consequently, the features in claims 1, 9, 21 and 22 relating to the generation of the flux are not considered obvious to a person skilled in the art, in light of the known technique described in D1.

In document D2 there is no information leading a person skilled in the art towards the possibility of using the described cable as winding in a **rotating** electric machine. Moreover, a person skilled in the art of designing rotating electric machines can not be expected to search for information in the field of linear electric machines. This is because these two types of machines have quite different areas of application and the problems connected with designing a rotating electric machine are in many ways principally different from the problems connected with designing a linear electric machine.

.../...

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE98/02161

**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V.

Accordingly, a person skilled in the art also cannot be expected to combine the two techniques described in D1 and D2 respectively.

Therefore, the invention according to claims 1, 9, 21 and 22 is not considered obvious to a person skilled in the art.

Consequently, the invention defined in claims 1, 9, 21 and 22 is considered to involve an inventive step (IS).

Claims 2-8, 10-20 and 23-32

Claims 2-8, 10-20 and 23-32 are dependent claims to claims 1, 9, 21 or 22. Consequently, bearing in mind the argumentation regarding claims 1, 9, 21 and 22, the invention according to claims 2-8, 10-20 and 23-32 fulfils the requirement of inventive step (IS).

Conclusion

The invention defined in claims 1-32 fulfils the requirement of novelty (N) and is considered to involve an inventive step (IS). The invention defined in claims 1-32 has industrial applicability (IA).

## PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION OF THE RECORDING  
OF A CHANGE(PCT Rule 92bis.1 and  
Administrative Instructions, Section 422)

To:

ASKERBERG, Fredrik  
L.A. Groth & Co. KB  
P.O. Box 6107  
S-102 32 Stockholm  
SUÈDE

<b>Date of mailing</b> (day/month/year) 17 November 1999 (17.11.99)	<b>IMPORTANT NOTIFICATION</b>
<b>Applicant's or agent's file reference</b> P 98-568/FA	
<b>International application No.</b> PCT/SE98/02161	<b>International filing date</b> (day/month/year) 27 November 1998 (27.11.98)

## 1. The following indications appeared on record concerning:

☒ the applicant
                 
 ☐ the inventor
                 
 ☐ the agent
                 
 ☐ the common representative

## Name and Address

ASEA BROWN BOVERI AB  
S-721 83 Västerås  
Sweden

## State of Nationality

SE

## State of Residence

SE

Telephone No.

Facsimile No.

Teleprinter No.

## 2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person
                 
 ☒ the name
                 
 ☐ the address
                 
 ☐ the nationality
                 
 ☐ the residence

## Name and Address

ABB AB  
S-721 83 Västerås  
Sweden

## State of Nationality

SE

## State of Residence

SE

Telephone No.

Facsimile No.

Teleprinter No.

## 3. Further observations, if necessary:

## 4. A copy of this notification has been sent to:

<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned
<input checked="" type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

S. De Michiel

Telephone No.: (41-22) 338.83.38

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents  
 United States Patent and Trademark  
 Office  
 Box PCT  
 Washington, D.C.20231  
 ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

<b>Date of mailing</b> (day/month/year) 12 August 1999 (12.08.99)	
<b>International application No.</b> PCT/SE98/02161	<b>Applicant's or agent's file reference</b> P 98-568/FA
<b>International filing date</b> (day/month/year) 27 November 1998 (27.11.98)	<b>Priority date</b> (day/month/year) 27 November 1997 (27.11.97)
<b>Applicant</b> SÖRENSEN, Erland	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

23 June 1999 (23.06.99)

☐ in a notice effecting later election filed with the International Bureau on:
2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO  
 34, chemin des Colombettes  
 1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Jean-Marie McAdams

Telephone No.: (41-22) 338.83.38